AMENDMENTS TO THE CLAIMS:

The following listing of the claims will replace all prior versions of the claims in the application:

1. (*Canceled*)

2. (*Previously presented*) A computer-based method for prediction of behavior in a financial system using financial return data, the method comprising the steps of:

inputting the financial return data and a set of independent variables corresponding to properties of the financial system into a computer, wherein the financial return data comprises a plurality of data points having multiple co-variances which are collected over time;

generating a co-variance matrix comprising the steps of:

(a) defining a first loading matrix having elements comprising a first subset of independent variables within the set of independent variables, the first subset comprising a least quantity of independent variables estimated to fit the financial return data;

(b) determining a goodness-of-fit to the financial return data according to a selected goodness-of-fit criterion for each independent variable within the first loading matrix;

(c) culling each independent variable within the first loading matrix whose presence or elimination fails to change the goodness-of-fit to produce a reduced element first loading matrix;

(d) defining a next loading matrix containing a larger subset of independent variables than the first loading matrix;

(e) adding the next loading matrix to the reduced element first loading matrix to define a combination of loading matrix elements;

(f) determining the goodness-of-fit to the financial return data for the combination of loading matrix elements;

(g) culling each independent variable of the combination of loading matrix elements whose presence or elimination fails to change the goodness-of-fit; and

(h) repeating steps (d) through (g) until the goodness-of-fit to the financial return data meets the selected goodness-of-fit criterion in a final iteration, wherein the resulting co-variance matrix comprises the combination of loading matrix elements wherein the number of off-diagonal, non-zero loading matrix elements in the co-variance matrix is

minimized and wherein the remaining independent variables comprise the smallest subset of independent variables that fits the financial return data.

3. (*Previously presented*) The computer-based method of claim 2, wherein the financial return data comprises daily returns of financial securities.

4. (*Previously presented*) The computer-based method of claim 3, wherein the daily returns comprise a linear combination of unknown factors and a part that fluctuates independently corresponding to noise, according to the relationship

$$\mathrm{X}_{\alpha} = \sum_{\beta=1}^{k} \Lambda_{\alpha,\beta} f_{\beta} + N_{\alpha},$$

where α and β are financial securities, X_α is the daily return for financial security α, f_β is an unknown factor, $\Lambda_{\alpha,\beta}$ is the loading matrix, and N_α is the noise.

5. (*Previously presented*) The computer-based method of claim 2, wherein the goodness-of-fit is the logarithm of the likelihood function according to the relationship

$$L = -2\ln \Pr(D|M) = \sum_{n} w_n \left(\ln\|V_n\| + x_n \cdot V_n^{-1} \cdot x_n\right),$$

where L is the log-likelihood function, V is the covariance matrix, $\Pr(D|M)$ is a goodness-of-fit quantity measuring the probability of data D given model M, and w_n is an arbitrary weight.

6. (*Previously presented*) The computer-based method of claim 2, wherein the least quantity of independent variables corresponds to zero unknown factors and a covariance matrix consisting of a diagonal.

7. (*Canceled*).

8. (*Previously presented*) A system for prediction of behavior in a financial system using financial return data, the system comprising:

a computer having an input for receiving the return data comprising a plurality of data points having multiple co-variances collected over a period of time and a set of independent variables corresponding to properties of the financial system;

computer software contained within the computer for performing a plurality of iterations, each iteration comprising identifying a loading matrix having elements comprising a subset of independent variables within the set of independent variables and determining a goodness of fit to the financial return data according to a selected goodness-of-fit criterion for each independent variable of the subset, eliminating each independent variable within the subset whose presence or elimination fails to change the goodness-of-fit at a predetermined minimum level, and combining, after the plurality of iterations, remaining independent variables to identify the smallest subset of independent variables that fits the financial return data to produce a co-variance matrix from a combination of loading matrices wherein the remaining independent variables correspond to loading matrix elements remaining after minimizing the number of off-diagonal, non-zero loading matrix elements;

wherein the plurality of iterations utilizes increasingly larger subsets of independent variables.

9. (*Previously presented*) The system of claim 8, wherein the financial return data comprises daily returns of financial securities.

10. (*Previously presented*) The system of claim 9, wherein the daily returns comprise a linear combination of unknown factors and a part that fluctuates independently corresponding to noise, according to the relationship

$$\mathrm{X}_\alpha = \sum_{\beta=1}^{k} \Lambda_{\alpha,\beta} f_\beta + N_\alpha ,$$

where α and β are financial securities, X_α is the daily return for financial security α, f_β is an unknown factor, $\Lambda_{\alpha,\beta}$ is the loading matrix, and N_α is the noise.

11. (*Previously presented*) The system of claim 8, wherein the goodness-of-fit is the logarithm of the likelihood function according to the relationship

$$L = -2 \ln \Pr(D|M) = \sum_n w_n \left(\ln \|V_n\| + x_n \cdot V_n^{-1} \cdot x_n \right),$$

where L is the log-likelihood function, V is the covariance matrix, $\Pr(D|M)$ is a goodness-of-fit quantity measuring the probability of data D given model M and w_n is an arbitrary weight.

12. (*Previously presented*) The system of claim 8, wherein the least quantity of independent variables corresponds to zero unknown factors and a covariance matrix consisting of a diagonal.

13. (*Canceled*).

14. (*Currently amended*) A computer-based method for prediction of behavior in a financial system using financial return data, wherein the financial system has properties corresponding to a set of independent variables, the method comprising:

inputting the financial return data ~~from the financial system~~ and the set of independent variables into a computer, wherein the financial return data comprises a plurality of data points having multiple co-variances which are collected over time; and

using computer software contained within the computer, ~~estimating~~ generating a multi-variable covariance matrix of the financial system comprising a plurality of variables and a plurality of factors using a subset of the plurality of factors, wherein the subset comprises a minimum number of factors that describe the plurality of variables and fit the financial return data, wherein the subset is selected by iteratively modeling each variable as a linear combination of unknown factors and a noise factor starting with zero factors and adding one factor with each iteration until a model is identified for which no further improvement occurs in the fit to the financial return data .

15. (*Previously presented*) The computer-based method of claim 14, wherein improvement is determined by a goodness-of-fit criterion comprising a log-likelihood function which is minimized using a conjugate gradient.

16. (*Currently amended*) The computer-based method of Claim 14, wherein each iteration comprises the steps of:

defining a loading matrix containing a group of factors;

minimizing the number of off-diagonal, non-zero factors in the loading matrix,~~;~~ wherein the covariance matrix is ~~estimated~~ generated by combining the loading matrices having a minimized number of off-diagonal, non-zero factors.